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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

WALLACE, SCOTT A

ART UNIT

PAPER NUMBER

2672

DATE MAILED: 03/27/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

09/357,528

Applicant(s)

ZWERN ET AL.

Examiner

Scott Wallace

Art Unit

2672

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 15-17 and 32-34 is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-9, 11-14, 18-20, 22-26, 28-31 and 35-36 is/are rejected.
- 7) ☒ Claim(s) 4, 10, 21, 27, 37 and 38 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.

- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: 6c. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1 and 5-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Finnigan et al. U.S. Patent No. 5,345,490.

4. As per claim 1, Finnigan teaches a method for automatically generating a fully-textured 3D model of an object; said method comprising: receiving from a camera a sequence of images taken sequentially and respectively around the object (column 2 lines 31-33); generating a 3D region from a sequence of mask images (column 2 lines 18-21); each of said mask images derived from one of said sequence of images; generating a mesh model from said 3D region using a tree structure (column 2 lines 18-26); and producing said fully-textured 3D model (solid model) from said mesh model with respect to said sequence of images (column 2 lines 18-26).

5. As per claim 5, Finnigan teaches wherein said generating a 3D region comprises: utilizing cubes representing said object; and carving said cubes recursively to fit said object by projecting said cubes against each of said mask images (column 2 lines 21-22).

6. As per claim 6, Finnigan teaches wherein each of said cubes is encoded as a node in said tree structure that grows, while said carving said cubes recursively proceeds, till a predefined degree of refinement (column 2 lines 18-26).
7. As per claim 7, Finnigan teaches wherein generating a mesh model comprises: collecting all leaves of said tree structure by traversing said tree structure, determining boundary cubes from said leaves (column 5 lines 47-54); and triangulating a group of at least three of said boundary cubes according to predefined rules (column 5 lines 47-54).
8. As per claim 8, Finnigan teaches wherein said mesh model is described by a plurality of triangles, each connecting three of said boundary cubes (column 1 lines 60-66).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 2,3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Finnigan et al. in view of Migdal et al. U.S. Patent No. 5,991,437.
11. As per claim 2, Finnigan teaches all the limitations of claim 1 as seen above. However, Finnigan does not teach receiving a reference image captured when a calibration target is in the place of said object; and deriving a camera model of said camera from said reference image. Migdal teaches this in column 4 lines 60-61 and column 6 lines 1-6. It would be obvious to one of ordinary skill in the art to use the calibration target of Migdal with the cameras of Finnigan. This would have been obvious because this not only allows one camera but multiple cameras to be calibrated.

12. As per claim 3, Finnigan does not teach wherein said calibration target is of round shape and has a center thereof, and wherein said reference image covers only a portion of said calibration target, said portion including said center. Migdal teaches this in column 6 lines 1-6. It would have been obvious to one of ordinary skill in the art to use the round shape with a center for a calibration target as in Migdal with the cameras of Finnigan. This would have been obvious because it allows for higher accuracy in calibrating the cameras.

13. Claims 9, 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Finnigan et al. in view of Weng et al. U.S. Patent No. 6,081,273.

14. As per claim 9, Finnigan teaches all the limitations of claim 8 as seen above. Finnigan does not teach assigning each of said triangles to one of said images according to a normal of said each of said triangles; and texturing said each of said triangles with respect to said one of said images. Weng does teach this in column 3 lines 8-19. It would have obvious to one of ordinary skill in the art to use apply texture to the triangles as in Weng to the triangles in Finnigan. This would have been obvious because it produces a model that more accurately reflects the real object.

15. As per claim 11, Finnigan teaches all the limitations of claim 1. Finnigan does not teach wherein said object is placed on a routable platform so that said sequence of images are taken when said object is rotated. Weng teaches this in Fig. 1b and 2. It would have been obvious to one of ordinary skill in the art to the routable platform of Weng with the cameras of Finnigan. This would have been obvious because this would have allowed for more accurate calibration.

16. As per claim 12, Finnigan does not teach wherein said routable platform is driven by a stepper motor controlled by a computing device that synchronizes said camera so that each of said images is taken at a known position. Weng teaches the routable platform as seen above. Weng does not specifically teach that the platform is driven by a stepper motor controlled by a computing device. This is inherent since small measurements are taken a computer connected to a motor would have to make and carry out these calculations. It would have been obvious to one

of ordinary skill in the art to use the platform of Weng with the cameras of Finnigan. This would have been obvious because it would allow for more accurate representation of the model.

17. As per claim 13, Finnigan does not teach wherein said sequence of images are taken when said camera is moved around said object. Weng does teach this in fig. 1b. It would have been obvious to one of ordinary skill in the art to move the cameras of Finnigan around the object as in Weng. This would have been obvious because it would have allowed for a more accurate representation of the model.

18. As per claim 14, Finnigan does not teach wherein each of said images is taken at a known position by said camera. Weng teaches this in figs. 1a,b and 2. It would have been obvious to one of ordinary skill in the art to take images at a known position as in Weng with the cameras of Finnigan. This would have been obvious because this would have allowed for a more accurate representation of the model.

Claims 18-20, 22-26, 28-31, 35-36 are similar to the claims as listed above and are thus rejected on the same premises. All the references use computers and software and thus has program code for achieving the specified functions.

Allowable Subject Matter

19. Claims 4, 10, 21, 27, 37-38 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

20. Claims 15-17 and 32-34 allowed. The references fail to teach detecting said center from said reference image and a pair of end points having a maximum distance, horizontally and vertically, respectively, from said center; and calculating a major axis and a minor axis extending from said center to said pair of end points, respectively.

Reference's cited

Computer Graphics: Principles and Practice 2nd.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Scott Wallace** whose telephone number is **703-605-5163**.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **Michael Razavi**, can be reached at 703-305-4713.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks


Washington, D.C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2600 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.



MICHAEL RAZAVI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600